



**cirad**

AGRICULTURAL RESEARCH  
FOR DEVELOPMENT

**DEVELOPMENTS IN  
INNOVATIVE TAPPING SYSTEM  
TO IMPROVE THE PRODUCTIVITY  
OF THAI RUBBER PLANTATIONS**

*A. Leconte, P. Chantuma, R. Lacote, S. Sdoodee and E. Gohet*

# World rubber cultivation: A changing context

## Industrial estates

Due to increasing scarcity of skilled manpower or tappers, labor productivity is maximized by using reduced tapping frequencies:  $d/3$ ,  $d/4$ ,  $d/5$ ,  $d/6$



**World rubber cultivation: A changing context**

**Smallholdings: evolution is opposite**

**Plantations owners try to compensate the small size of their farms through tapping intensification:  $d/2$ ,  $2d/3$ ,  $3d/4$ ,  $d/1$**

**This leads to a low tapping productivity resulting from physiological fatigue, tapping panel dryness and reduces the plantation lifespan**

# Thai rubber plantations

- Mainly smallholdings with very small size (< 2 ha)
- High tapping frequencies: 2d/3, 3d/4, 5d/6, d/1
- Shortened cut length: 1/3 S

*The entire plantation = one tapping task  
on which tapping is performed every day...*

# Thai rubber plantations

- **Crop-sharing system (tapper 40%, owner 60%) favours acceleration of tapping by the tappers.**
- **Replanting regulations: also push for intensive tapping, since planters can apply to replanting subsidies when bark is not available anymore.**

# Thai rubber plantations

## Consequences of intensive tapping systems

- Overexploitation of the trees → physiological fatigue
- High tapping panel dryness (TPD) rates
- Short life-cycle of the plantations (high bark consumption)
- Low tapper and planter incomes compared to the potential *modifier : high kg/ha but low kg/tapper/d*

# Physiological and practical causes for this low productivity

- Insufficient time for latex regeneration between consecutive tappings, preventing the use of Ethephon stimulation because of a too low latex sugar content
- Use of 1/3 spiral cut, often leading to a huge “island bark” on third panel (B0-3)
- Increasing trend to early opening of small trees
- Impossibility to use controlled upward tapping

# How to improve productivity of Thai rubber plantations in a sustainable way?

## Testing and developing innovative tapping systems

### Double Cut Alternative (DCA)

“An innovative tapping system, the Double Cut Alternative, to improve the yield of *Hevea brasiliensis* in Thai rubber plantations”

P. Chantuma, R. Lacote, A. Leconte & E. Gohet

*accepted for publication in Field Crops Research (2011)*



# **“Towards the Improvement of the Rubber Tree Productivity” a Thai-French Cooperation since 1998**

**RRIT-DOA**



**KU**



**CIRAD**



**PSU**



## **Hevea Research Platform in Partnership (HRPP)**

***Created in May 2008***

# DCA Experimental sites

## □ Chachoengsao:

3 on-station trials (2 on RRIM600 in 2000 + 1 on BPM 24 in 2007)

## □ Chantaburi:

1 on-farm trial on RRIM600 (2004)

## □ Songkhla:

1 on-station trial on RRIM600 (2007)

8 on-farm trials on RRIM600 (2 in 2007 + 6 in 2008)

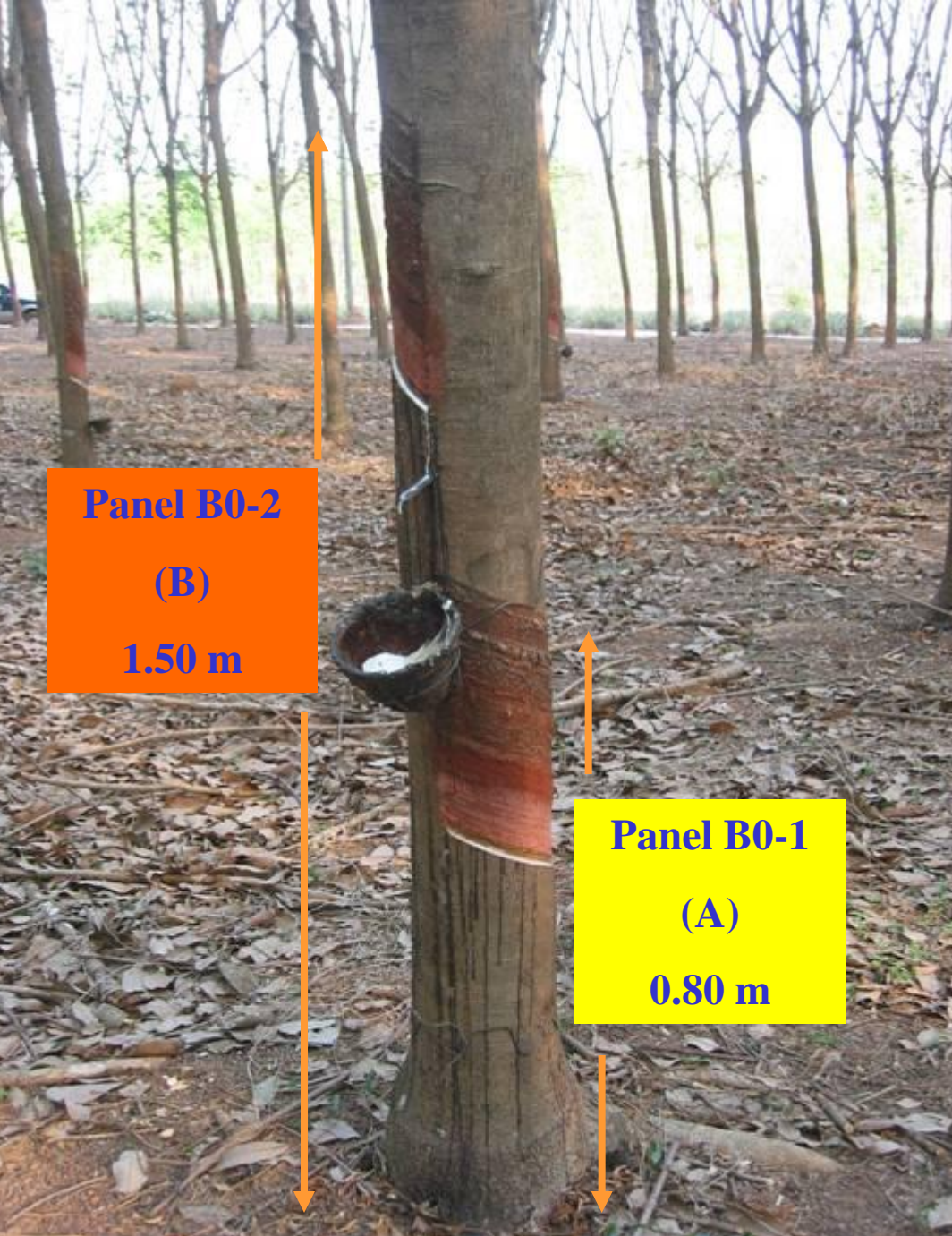


# “Double Cut Alternative” (DCA)

In the context of low tapping productivity, this new tapping strategy has been firstly implemented and tested from 2000 onwards at the Chachoengsao Rubber Research Center (CRRC), then in different on-farm trials.

Aim = to optimize high tapping frequencies by splitting tapping on two different cuts, tapped alternately, in order to increase latex regeneration time in the bark.





# DCA

## Tapping Strategy

**$2 \times 1/2 S d/4 (t,t)$**   
**(equivalent  $1/2 S d/2$ )**

The 2 cuts should be located on opposite tapping panels and vertically as distant as possible to reduce their possible competition regarding carbohydrates, water and mineral supply

Both panels are used together and **alternately** from the opening

# DCA Tapping Strategy

The principle of DCA is to split the single tapping cut into two on the same tree:

TAPPING FREQUENCY (7d/7)			TAPPING SEQUENCE													
			Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Standard	d/2		T		T		T		T		T		T		T	
DCA	2 x d/4	High	T				T				T				T	
		Low			T				T				T			

**$2 \times 1/2S \text{ d/4 (t,t)} = \text{equivalent to } 1/2S \text{ d/2}$**

**At tree level, tapping frequency is maintained in d/2, 7d/7**

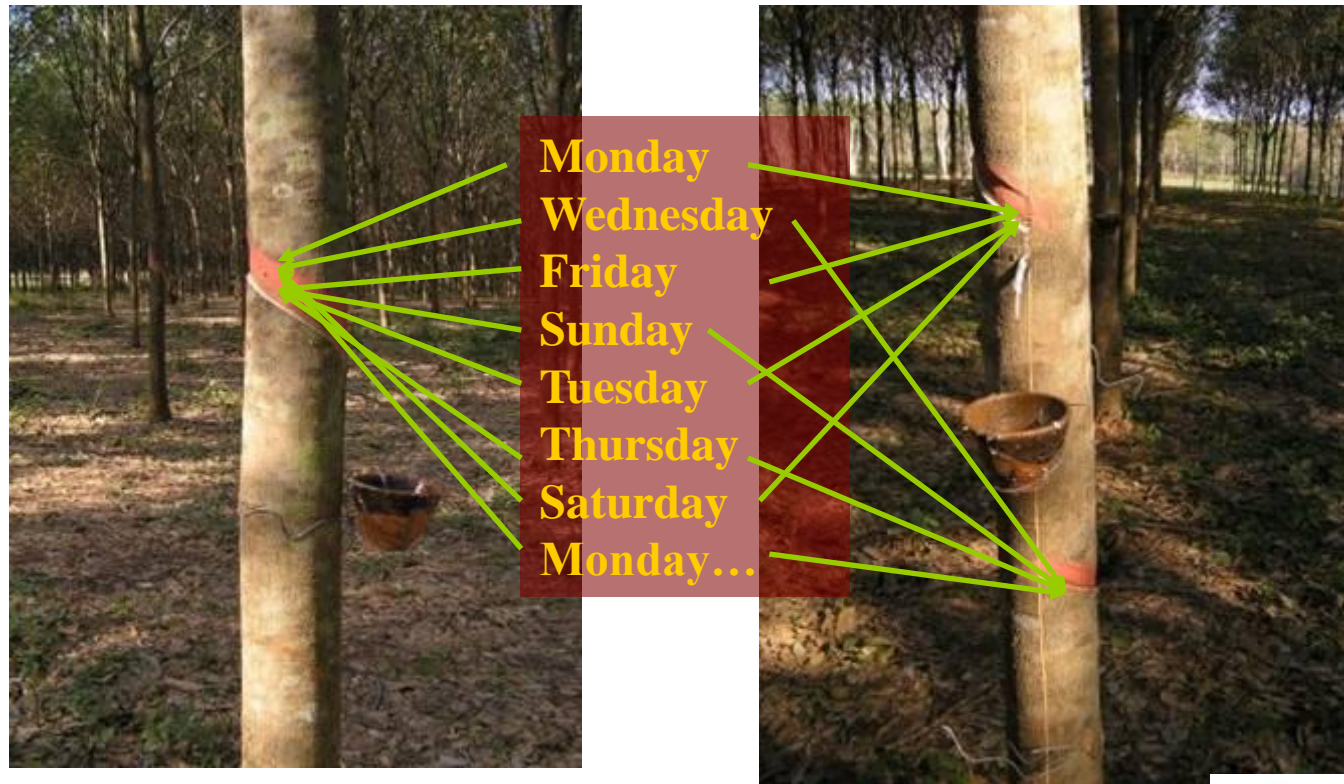
**While the tapping frequency remains the same for the tree, the regenerating time is twice as much for each of the two cuts.**

# DCA Tapping Strategy

## DCA applied on 1/2 Spiral d/2 (7d/7)

1/2S d/2

2 x 1/2S d/4 (DCA)



# Application of DCA tapping system to higher tapping frequencies:

**1/3S 2d/3 (7d/7)**

TAPPING FREQUENCY (7d/7)			TAPPING SEQUENCE													
			Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Standard	2d/3		T	T		T	T		T	T		T	T		T	T
DCA	2 x d/3	High	T			T			T			T			T	
		Low		T			T			T			T			T

**DCA: 2 x 1/3S d/3 (t,t) = equivalent to 1/3S 2d/3**

**At tree level, tapping frequency is maintained in 2d/3, 7d/7**



# Application of DCA tapping system to high tapping frequencies: $1/3S$ $3d/4$ ( $7d/7$ )

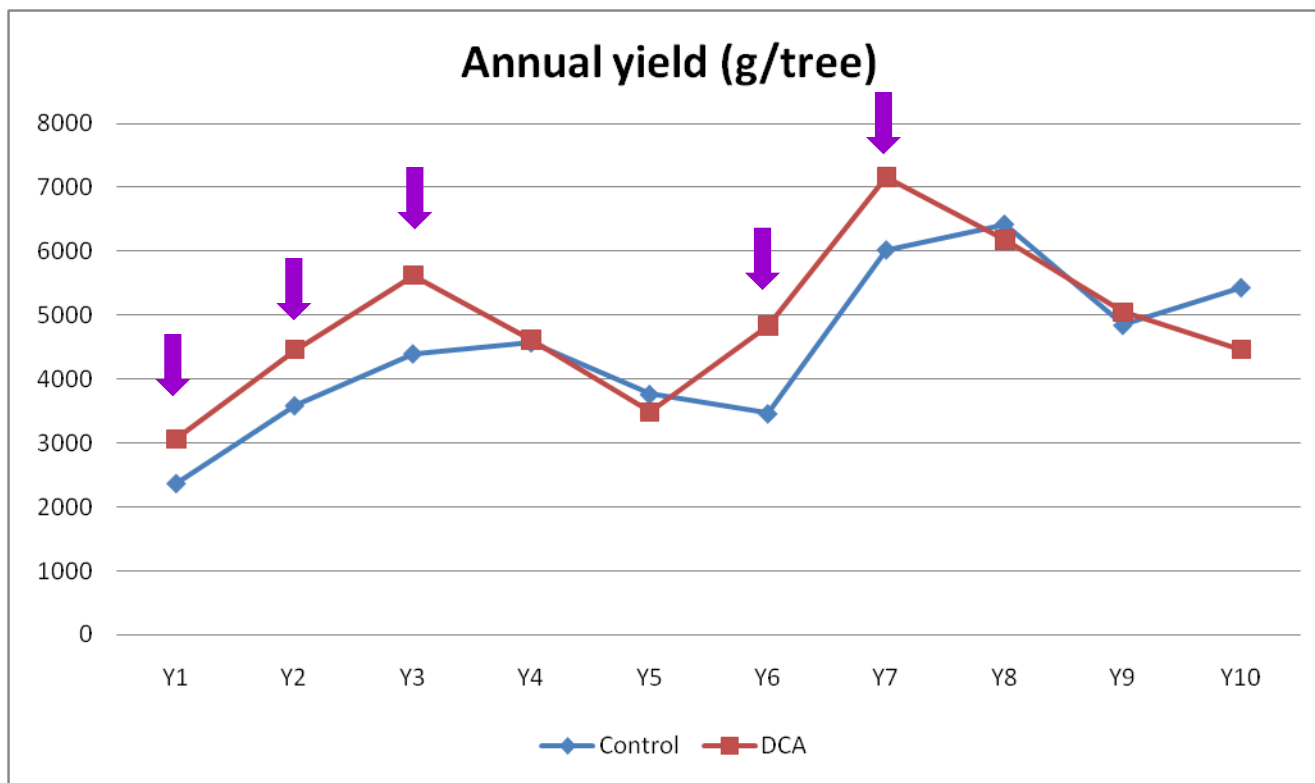
			TAPPING SEQUENCE													
TAPPING FREQUENCY (7d/7)			Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Standard	3d/4		T	T	T		T	T	T		T	T	T		T	T
DCA	2 x d/2 (1/3) d/3 (2/3)		High	T		T			T			T		T		T
			Low		T			T		T			T		T	

**DCA:  $2 \times 1/3S$   $d/2$  ( $1/3$ ) +  $d/3$  ( $2/3$ ) (t,t) = equivalent to  $1/3S$   $3d/4$**

**At tree level, tapping frequency is maintained in  $3d/4$ ,  $7d/7$**

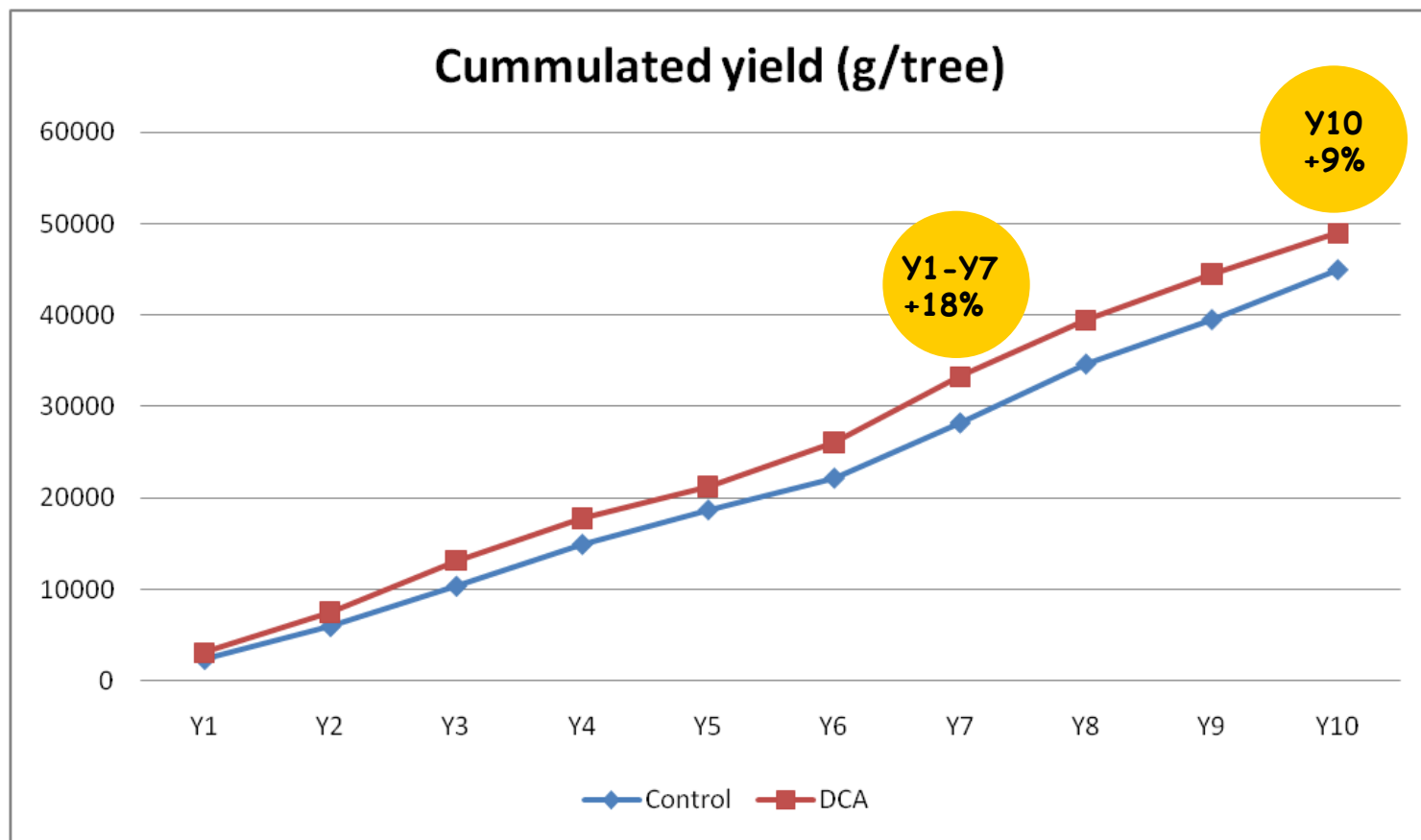


# DCA: Results Chachoengsao



**DCA provided a significant yield improvement compared to the recommended system (1/2 S d/2 nil stim) especially in Years 1, 2, 3, 6 and 7**

# DCA: Results Chachoengsao



**DCA: significantly higher until end of year 7 (+18% since opening)**

**Although not anymore significant after 8 years of tapping, cumulative g/tree of DCA still represented an observed increase of +9% over 1/2S d/2**

# DCA: on-farm trials at Songkhla

## Experimental plots and treatments

### Hurae, Hat Yai District

4 farmers

1 trial in 2007

3 trials in 2008

Tapping system: 1/3S 2d/3

### Namom District

4 farmers

1 trial in 2007

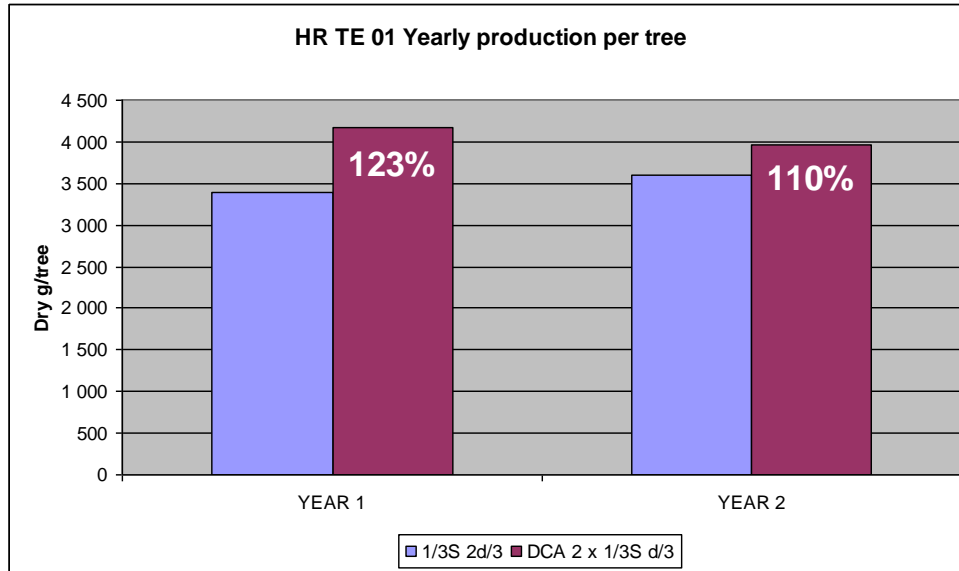
3 trials in 2008

Tapping system: 1/3S 3d/4

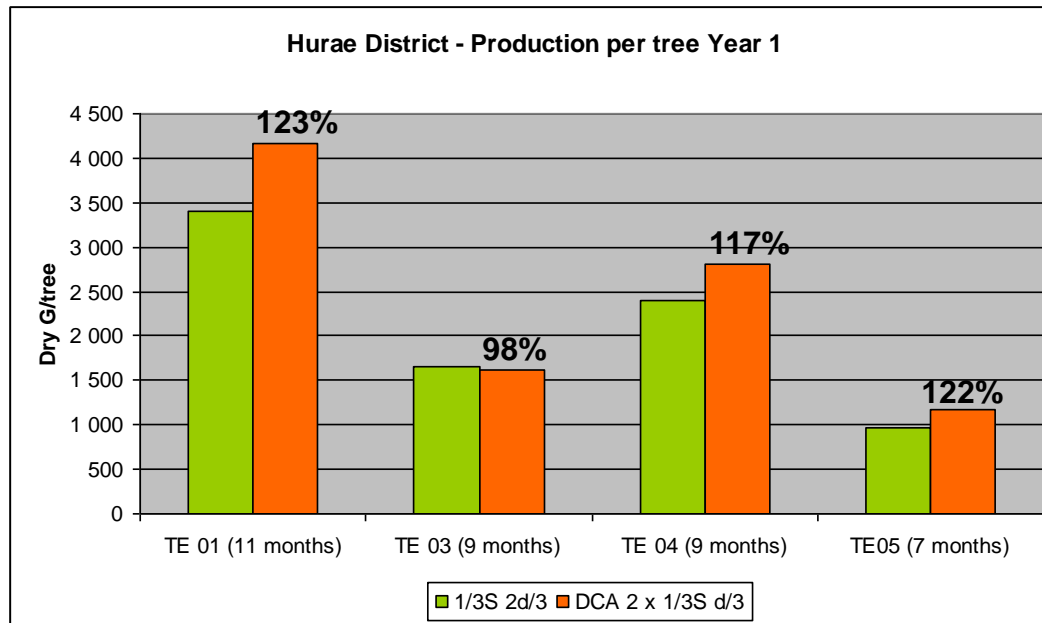




# DCA: Results Songkhla (on-farm at Hurae)



In the first trial, started in 2007, DCA system showed an higher yield per tree (+23% and +10%) compared to the current tapping system of the farmer, leading to an higher income



For all trials, DCA system in Year 1 provided higher yield (+17% to +23%) in 3 trials out of 4



# DCA: Preliminary conclusions

**10 years experiment at CRRC showed that**

- **DCA tapping system improved latex regeneration and subsequently increased output per tree and per tapping (+9% along 10 years)**
- **During the first seven years of tapping, cumulative rubber production was significantly increased compared to the equivalent intensity with single cut tapping system (1/2S d/2)**
- **DCA allowed in maintaining correct physiological profiles and a good relation between girth and production**

# DCA: Preliminary conclusions

On-farm experiments carried out in East Thailand (Chantaburi) and in the traditional area for growing rubber (South Thailand, Songkhla) confirmed the promising results already recorded with on-station experiments implemented from 2000 onwards at CRRC.

Chantaburi and Songkhla are the first locations where DCA tapping system is applied on high tapping frequencies (**2d/3** and **3d/4**) associated with a shortened tapping cut (**1/3S**)

Preliminary results showed that DCA could perform improvement of **yield** (g/tree), **labor productivity** (g/tree/tapping) and **farmers income** in most of cases

# DCA: Preliminary conclusions

DCA system is efficient without any external input such as Ethephon stimulation.

The use of DCA system would not modify the tapping work organization on farms, since tapping frequencies would remain unchanged at tree scale. The tapping intensity is just shared on two cuts alternately instead of one single cut with conventional tapping systems.

*DCA tapping strategy appears as the only current solution to increase production and/or labour productivity of rubber smallholdings using high tapping frequencies.*



# DCA: Preliminary conclusions

Nevertheless, it is still too early to envisage a recommendation of DCA tapping strategy on a large scale in Thailand rubber smallholdings.

**The network of trials with farmers must be extended:**

- In Songkhla province
- In other Southern provinces (traditional area)
- In North & North-East (non traditional areas)

Long run and multi-sites evaluation of the system is necessary in order to validate its **feasibility** and **sustainability**.

# *Thank you for your attention*

